A Dissertation on

ANALYTICAL STUDY ON VENTRAL HERNIA PRESENTING AS SURGICAL EMERGENCY

submitted to

THE TAMILNADU Dr. M.G.R MEDICAL UNIVERSITY
CHENNAI - 600 032.

In partial fulfillment of the requirments

for the award of the degree of

M.S. GENERAL SURGERY
BRANCH - I

KILPAUK MEDICAL COLLEGE
CHENNAI - 600 010.

MARCH - 2009

BONAFIDE CERTIFICATE

Certified that the dissertation titled **"ANALYTICAL STUDY ON VENTRAL HERNIAS PRESENTING AS SURGICAL EMERGENCY"** is a bonafide work of the Candidate **Dr. G. ARUL KUMAR,** carried under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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ACKNOWLEDGEMENT

I wish to thank our respected Dean **Dr. M.DHANAPAL, M.D.,D.M.** for having given me the permission to conduct this study in our hospital.

I owe my sincere gratitude and heartfelt thanks to **Prof. Dr.G.GUNASEELAN, M.S.** Head of the Department of General Surgery and my Unit Chief who has inspired me immeasurably during my training as a postgraduate student.

This study would have not been possible without the support of my Unit Assistant Professors **Dr. SURESH,D.A.,M.S., Dr.B.SATHYAPRIYA, M.S., Dr.VARADHARAJAN, M.S**. and **Dr.KOPERUNDEVI, D.G.O.,M.S.** to whom I owe my surgical training.

I wish to express my sincere thanks to all the Unit Chiefs and Asst. Professors and also my Co-PGs for their help and support.

Finally, I would like to dedicate this study to all our patients without whose co-operation this study would not be possible.

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Introduction

ANALYTICAL STUDY ON VENTRAL HERNIA PRESENTING AS SURGICAL EMERGENCY

INTRODUCTION

Ventral hernia is a herniation of a viscus or part of a viscus through a defect in the anterior abdominal wall. Ventral hernia is a common condition encountered by a surgeon in elective as well as emergency situation. Most of the ventral hernias are asymptomatic or have only minor (or) intermittent complaints. So, most patients undergoing repair of ventral hernias do so only after the hernia has reached a significant size (or) has become complicated. Though many studies relating to the management and complications of elective ventral hernia repair are available, little is studied about those hernias presenting as emergency. This study would throw light on the mode of presentation of different types of complicated ventral hernias and their management and also analyze its postoperative outcome in terms of morbidity and mortality.

Aim of the study

AIM OF THE STUDY

- To find the age and sex distribution of complicated ventral hernias.
- To find the occurrence of complication in various types of ventral hernia.
- To analyze the types of complication and nature of surgery performed.
- To analyze the morbidity and mortality when emergency surgery is performed for those complicated ventral hernias.

Materials and Methods

MATERIALS AND METHODS

This study in conducted during the period of 2006-2008 at Kilpauk Medical College Hospital. All adult patients with ventral hernia on whom emergency surgery was performed were included in this study. Patients included in this study presented with complication like acute irreducibility (or) Intestinal obstruction (or) with signs of strangulation (or) burst abdomen. Clinical findings at the time of presentation, per-operative findings and the type of surgery performed were recorded in a proforma and patients were prospectively followed up till the day of discharge.

Inclusion Criteria:

- All adult patients with complicated ventral hernias above the age of 14 years.
- All Ventral hernias admitted in the department of general surgery with signs of irreducibility or obstruction or strangulation or secondary burst abdomen.

Exclusion Criteria:

- Groin hernias, Lumbar hernias and Pelvic hernias.
- Partially irreducible ventral hernias.
- Ventral hernia with chronic irreducibility.

PROFORMA

Name : Age/Sex: IPNo.:

Complaints: Duration

- Pain ☐
- Vomiting ☐
- Irreducibility ☐
- Constipation ☐
- Abdomen distension ☐

Duration of ventral hernia:

H/O Previous Surgery :

O & G H/O (In Females) :

COMORBID ILLNESS :

DM ☐ HTN ☐ IHD ☐

PTB ☐ BA ☐ Others ☐

HABITS:

Diet : Veg/Non-Veg Smoking ☐ Alcoholism ☐

CLINICAL EXAMINATION:

Built & Nourishment:

Anaemia ☐ Clubbing ☐ Icterus ☐

Cyanosis ☐

Pedaledema ☐ Generalized Lymphadenopathy ☐

BP: _____ PR: _____

CVS: _____ RS: _____

P/A:

Type of ventral hernia:

Epigastric ☐ Umbilical ☐ Paraumbilical ☐ Incisional ☐

Preoperative Findings:

Content :

Viable (or) Non viable :

Surgery Performed:

Anatomical Repair ☐ Mesh Repair ☐ Others ☐

Other Procedure performed:

Omentectomy / Adhesion release / Constriction ring release / Resection and Anastomosis

Post Operative follow-up:

Morbidity:

Seroma ☐ Haematoma ☐ Wound Infection ☐ Wound gaping ☐

Respiratory Failure ☐ Others ☐

Mortality:

(If any with cause of death) : _____

Review of literature

REVIEW OF LITERATURE

VENTRAL HERNIA

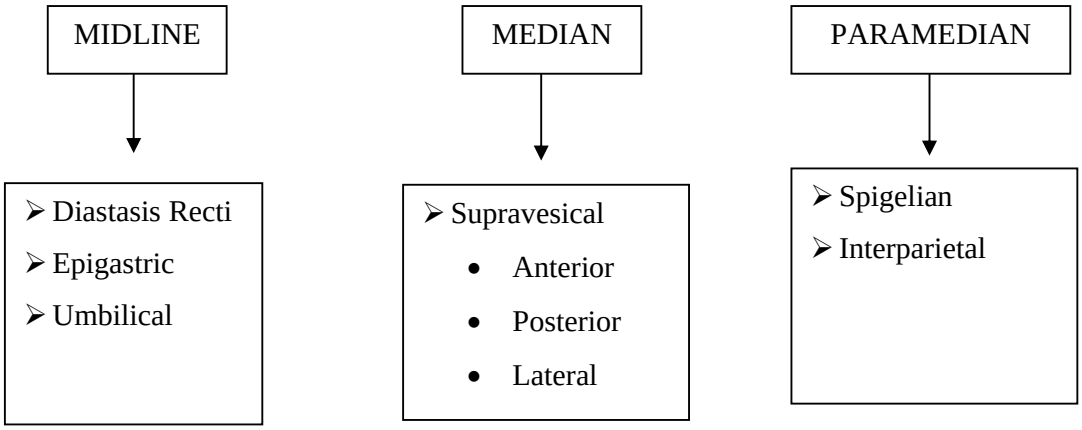
Many classifications for groin (or) inguinal hernias have been proposed over the past 50 years, but none have been published for total classification of all ventral hernias of the abdomen. Using a strict definition of ventral, any hernia of the entire abdomen would qualify, including those of the diaphragm, pelvic floor and lumbar areas. By common convention however, ventral hernias are thought of as those occurring in the anterior abdominal wall. One possible system to categorize these anterior ventral hernias might be as follows:

a. Congenital
b. Acquired
c. Incisional
d. Traumatic

Classification of Ventral Hernias

A. Congenital - Present at birth
    i. Omphalocele
    ii. Gastrochisis
    iii. Umbilical – infant

B. Acquired



C. INCISIONAL:

- Midline
- Paramedian
- Transverse
- Special operative sites

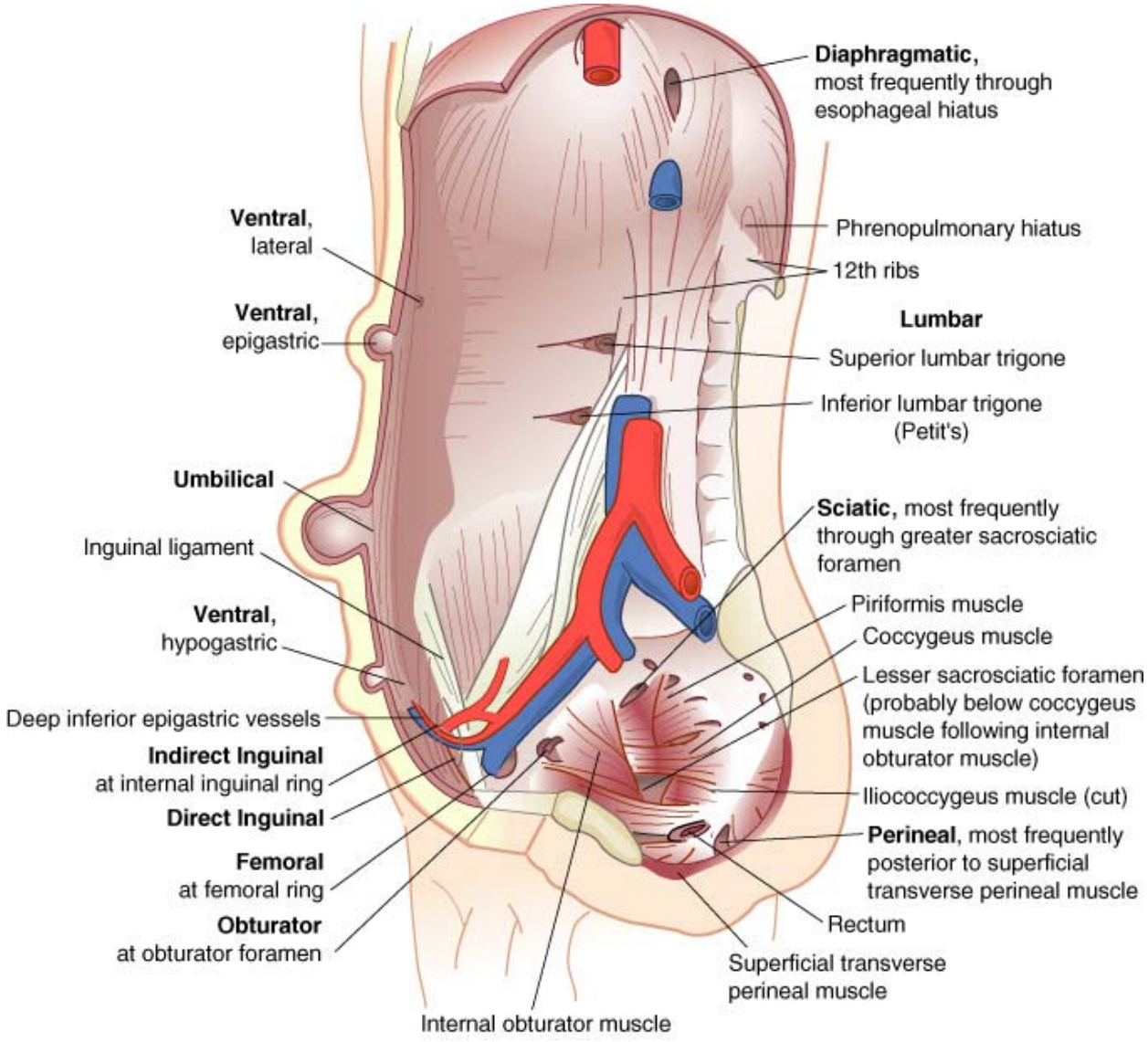
D. **TRAUMATIC**

- Penetrating
- Blunt
- Destructive

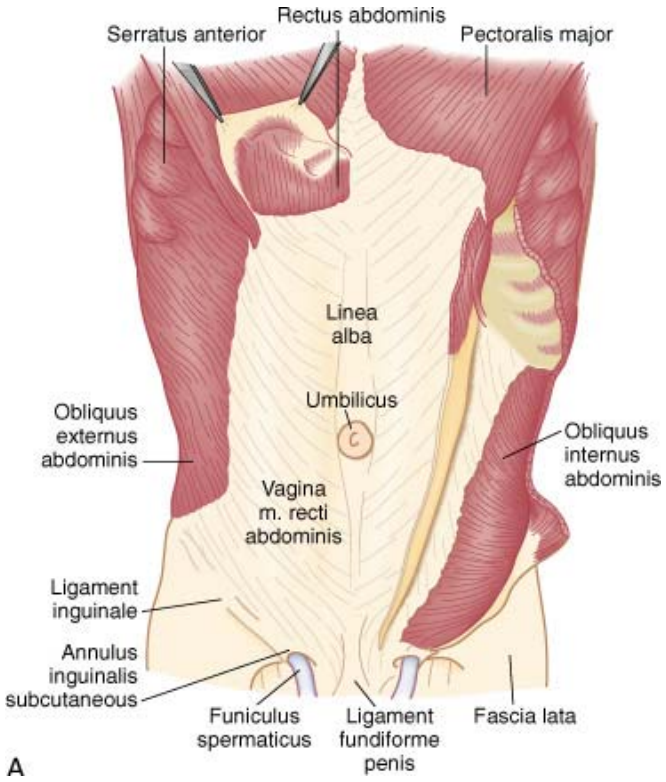
Among all the types of ventral hernias commonly seen types are incisional, umbilical (adult), paraumbilical, epigastric and interparietal hernia.

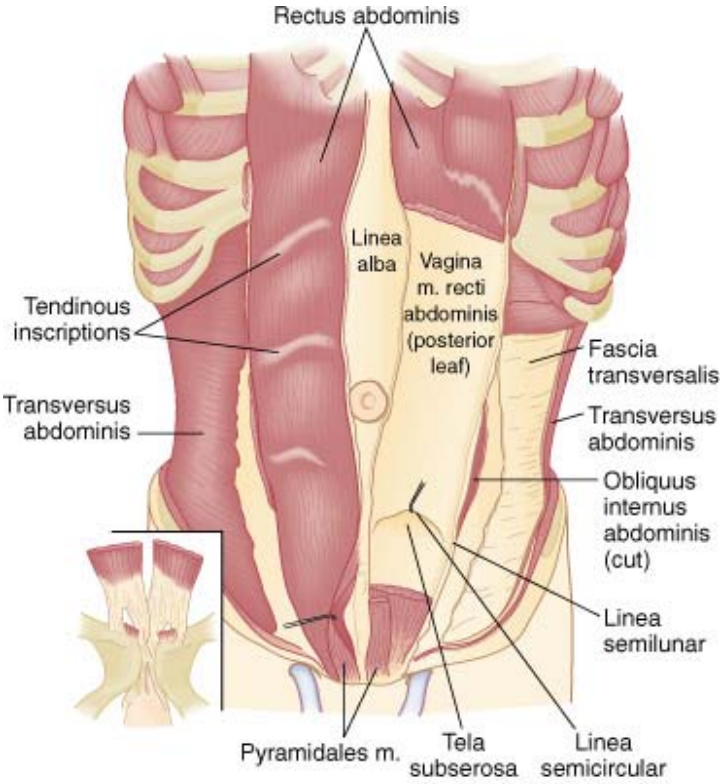
An understanding of the anterior abdominal wall anatomy is essential to understand about hernias.

TYPES OF VENTRAL HERNIA



ANATOMY OF THE ANTERIOR ABDOMINAL WALL





ANATOMY OF THE ANTERIOR ABDOMINAL WALL

The anterior abdominal wall may be considered to have two parts - an anterolateral portion composed of the external oblique, internal oblique and transverse abdominus muscles and a midline portion composed of the rectus abdominus and pyramidalis muscles.

ANTEROLATERAL PORTION

The three flat muscles mentioned above are arranged so that their fibres are roughly parallel as they approach their insertion on the rectus health.

MIDLINE PORTION

When present, the insertion of the pyramidalis into the linea alba is a landmark for an accurate midline incision.

The rectus muscle is enclosed in a stout heath formed by the bilamimar aponeurosis of the abdominal muscles, which pass anteriorly and posteriorly around the muscles and attach medially to the linea alba which is formed by decussation.

In the lower ¼ of the abdominal wall the aponeurosis of the internal oblique and transverse abdominus muscle pass anterior to the muscle which is bounded posteriorly by the tramsversalis fascia only.

The dividing line is the linea scmicirularis of Douglas, which marks the level at which the rectus sheath loses its posterior wall. The line is well marked if the change in abrupt, it is less definite if the change is gradual.

The following array shows some comparisons between the structures of the upper ¾ and lower ¼ of the abdominal wall.

Upper abdominal wall	**Lower abdominal wall**
Linea alba well developed	Linea alba not well developed
Right and left recti well separated	Right and left recti very close together
External oblique fascia and aponeurosis weak or absent	External oblique fascia strong and well developed
Both layers of rectus sheath present	Only anterior layer of rectus sheath present

The lower abdominal wall is prone for incisional hernias due to the above factors.

BLOOD SUPPLY TO THE ANTERIOR ABDOMINAL WALL ARTERIAL SUPPLY

The lower anterolateral abdominal wall is supplied by three major branches of the femoral artery.

1. Superficial circumflex iliac. A.
2. Superficial epigastric. A
3. Superficial external pudendal .A

These superficial arteries travel towards the umbilicus in the subcutaneous connective tissue the superficial epigartric artery anastamoses with the contralateral artery and three arteries have anastomoses with the deep arteries.

The deep arteries which supply the anterior abdominal wall are

1. Posterior intercostals arteries 10 and 11
2. The anterior branch of subcostal artery
3. The anterior branches of the four lumbar anteries
4. The deep circumflex iliac artery

These arteries lie between the transverses abdominus and the internal oblique muscles.

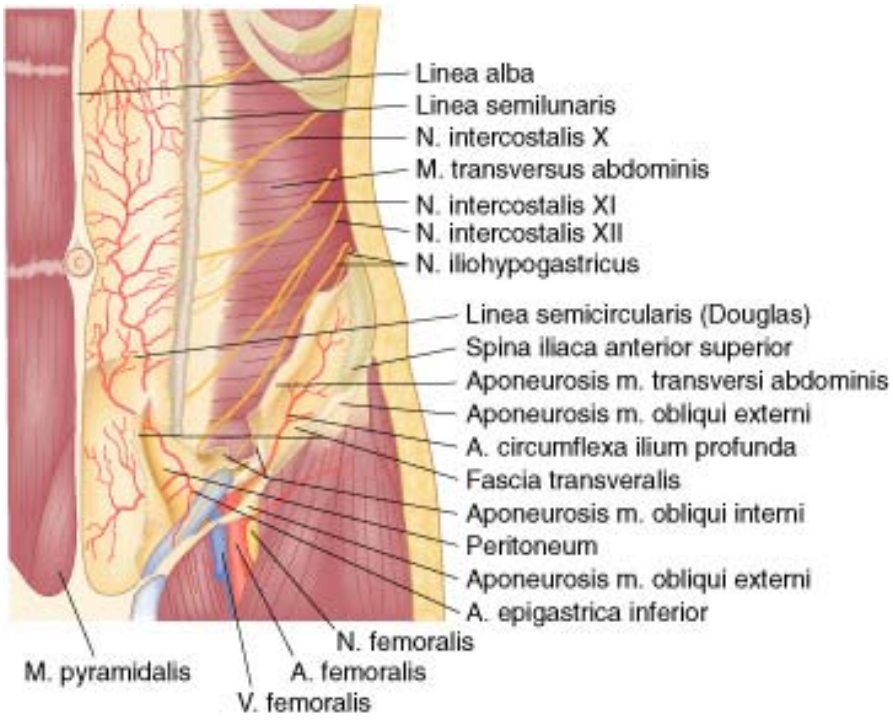
The rectus sheath is supplied by the superior epigastric artery, which arises from the internal thoracic artery and the inferior epigastric artery, which arises from the external iliac artery just above the inguinal ligament.

The superior epigastric artery enters the upper end of the rectus sheath deep to the rectus muscles. Musculocutaneous branches pierce the anterior rectus sheath to supply the overlying skin. The perforating arteries are closer to the lateral border of the rectus than to the linea alba. The inferior epigastric artery lies first in the preperitoneal connective tissue and enters the sheath at or above the level of linea semilunaris, passing between the rectus muscle and the posterior layer of the sheath.

VENOUS DRAINAGE

The veins follow the corresponding arteries:

BLOOD SUPPLY AND INNERVATION OF ANTERIOR ABDOMINAL WALL



NERVE SUPPLY TO THE ANTERIOR ABDOMINAL WALL

Both the anterolateral portion of the abdominal wall and the rectus abdominies muscles are supplied by

1. Anterior rami of the seventh to the twelfth thoracic nerves and
2. First lumbar nerve

SURGICAL ANATOMY OF UMBILICAL REGION

At birth the umbilical arteries and the umbilical vein become thrombosed, and the vitellime duct and the allantois have already been obliterated. The umbilical ring then scars and contracts. The obliterated umbilical vein (round ligament) in usually attached to the inferior border of the umbilical ring along with remnants of the urachus and the two obliterated umbilical arteries. The round ligament, by crossing and partially covering the umbilical ring, may protect against herniation. In instance where the ligament divides and insert in the upper part of the umbilical ring without crossing it, a potential weakness is present. The umbilical richets fascia also reinforces the umbilical ring. If richets fascia is absent, located outside the limits of the umbilical ring (or) only partially covers the ring, the area appears much weaker. Askar reported a detailed anatomic study of the anterior abdominal wall and demonstrated that these tendinous fibers do not stop in the midline but decussate, creating on intricate interwoven pattern that links all layers of the abdominal wall with those of the other side. Askar believes that variation in decussation of aponeurotic fibres in the midline have a role in the occurrence of umbilical and para umbilical hernias.

INCISIONAL HERNIA

Incisional hernias are unique in that they are the only abdominal wall hernias that are considered to be iatrogenic. Incisional hernia continues to be one of the most common complications of abdominal surgical procedures and is a significant sources of morbidity and loss of time from productive employment. Number of reports in the literature suggest that the incidence is probably between 2% and 11%

Predisposing factors of incisional hernia

1. Obesity
2. Wound Infection
3. Wound dehiscence
4. Postoperative haematoma (or) seroma
5. Type of incision
6. Poor technique of wound closure
7. Inadequate available abdominal wall (resulting from poor surgery or trauma)
8. Post operative distension (due to prolonged ileus)
9. Ascites
10. Pulmonary infection
11. Anemia / Hypoproteinemia
12. Steroids / Chemotherapeutic agents.

Patient Related Factors

Obesity, older age, malnutrition abdominal distension, post operative pulmonary complication, male gender, the presence of jaundice and other number of patient related factors correlate with the propensity to develop incisional hernia.

Wound Infection

The most common factor responsible for the development of incisional hernia is a post operative wound infection.

Buckmall and colleague in their studies reported five fold increased risk of incisional hernia when there is a post operative wound infection.

Incision Type

Transverse abdominal incisions have less risk of a postoperative incisional hernia. The fascial fibers of the anterior abdominal wall lie in a transverse orientation. Therefore a vertical incision would divide them. Suture closure of such vertical wounds would infact, place the suture materials between the fibers. Contraction of the abdominal wall would cause laterally directed tension on the closure and might cause the suture material to cut through by separation of the transversely oriented fibers. In contrast, a transverse incision open the fascia along the fibers such that the suture

closure places the suture material around the fibers on contraction, the fibers and apposed, and the suture material would realize minimal laterally directed tension. Therefore incisional hernia is more common after midline as opposed to transverse incision.

Surgical Technique

Other concerns related to the type of abdominal wall closure have to do with the use of continuous verses interrupted sutures and mass versus individual layer closure, randomized studies have failed to demonstrate that any of there factors significantly alters the incidence of postoperative incisional hernia.

Excessive tension placed as the suture reduces local blood flow and tissue necrosis. “Button Hole” hernia results at the site of sutures penctrating the aponeuroses. Suture length to wound length ratio should be at least 4 to prevent the development of incisional hernia.

Suture Material

The ideal suture material should have three important characteristics retention of high tensile strength, monofilament structures so that bacteria cannot hide within the interstices and absorbable qualities so that the material is ultimately eliminated as a source of infection.

Complications

i. Irreducibility (or) incarceration

Due to adhesions between the sac, its content and the abdominal wall (or) due to a narrow neck

ii. Intestinal obstruction :

Intermittent (or) complete intestinal obstruction can occur if the sac has incarcerated bowel in it. Due to development of adhesion between the bowel loops and between the sac and the bowel, resulting in kinking and angulation

iii. Strangulation

The viscus may become strangulated if the blood supply to the contained viscera is shut off.

Local and general consequences of incisional hernias:

Loss of abdominal wall integrity leads to general disturbances which is referred to 'incisional hernia disease'.

Parietal Disease

1. Muscular Disease

The rectus muscles are "Sagitalised" and their contraction no longer offer resistance to protrusion, but pushes the viscera out of the abdominal cavity via a movement of enucleation. Apparent loss of abdominal wall tissue due to a pronounced diastasis.

2. Skin Disease

Trophic ulceration at the apex of protrusion due to loss of subcutaneous tissue and flattening and thrombosis of small vessels due to the pressure of viscera. There is a risk of infection leading to burst abdomen and fistulization of small bowel or colon.

General Disease

1. Respiratory Disturbance

Related to the absence of normal contribution of the abdominal muscles, abdominal pressure and diaphragm in respiration

2. Effects of reintegration on respiratory function

In some case, voluminous herniation cannot be reintegrated into the abdomen. The herniated organs have lost their “right to reside in the abdomen”. Hernial reduction in such case produce increased abdominal pressure and diaphragmatic immobilization. These may be responsible for postoperative death due to progressive respiratory insufficiency.

Visceral Disturbances

The pressure within a hollow viscus results from a state of equilibrium. The latter is disrupted when the abdominal pressure decreases. Distension and increase in intraluminal pressure of these organs have a negative effect on their vascularization and function eg; disturbed intestinal

transit and micturition. Splanchnomegalia is an unsusual consequence and some times it is necessary to perform a bowel resection to reintegrate the viscera and close the abdominal wall

Vascular Disturbances

Massive incisional hernia hinders caval and portal venous return, because the maintenance of correct abdominal pressure plays a role in normal venous circulation.

Static Disturbances

Abdominal muscles act as an anterior brace for the spine when the subject is in standing position. Accordingly weakness of these muscles, especially of the rectus abdomini, will lead to exaggeration of lumbar lordosis and strain on the spine.

Treatment

There is hardly any scope for conservative treatment in case of incisional hernia. Conservative treatment can be adopted to those patients with poor general condition, wide defect and spontaneously reducible hernia.

Surgical Treatment

Three techniques can be used for hernia repair. Simple apposition, complex apposition and mesh repairs.

Simple Apposition

The hernial sac is dissected. It is then formally, if not already inadvertently opened and the contents are reduced. Adherent omentum and bowel have to be freed by dissection before the mouth of sac can be defined. The layers are repaired usually with non absorbable suture, first the peritoneum, then the fascia are freed from the overlying muscles for some distance and then fascial layer is approximated with interrupted suture at the upper and lower ends of the wound. The muscles and remaining fascial layers are approximated. Tension relaxing incisions may be required and should be placed well laterally.

Complex Apposition

These consist of various types of layered closure (Mayo, Keel and Nuttals procedure) and should be considered obsolete and of historical interest only

Mesh repair

Whenever there is local non-availability of tissues suitable for reconstruction or when a good fascia cannot be approximated without undue tension, prosthetic reinforcement is imperative and universally used.

Ideal requisites for the darns and implants are:

I. They must be inert and excite as little tissue reaction as possible.

II. They must be flexible in all directions so that they can move and curve with the rest of the abdominal wall.

III. They must be strong enough to resist any increase in intra-abdominal pressure.

IV. They must be strong enough to resist the stresses and strains without breaking up before they have served their purpose.

V. They should be in the form of a mesh, so that they can easily be penetrable by the vascular and fibrous tissue and become fully incorporated in the abdominal wall.

VI. Materials must be soft, pliable and be able to cut into desirable shapes without the losing their strength.

VII. It must be non-fragmentable.

VIII. It should not wander in the abdominal wall and cause complications.

IX. Ease of sterilization is another important factor. If the material can be re-sterilized without loss of strength, the material can be optimally used without much wastage.

Types Of Material Used

Synthetic

- Polypropylene (prolene)
- Dacron Polyester
- Nylon (Polyamide)
- Teflon (Polytetrafluoroethylene)
- Ivonlon sponge (formalized polyvinyl alcohol)

Of all these synthetic materials- prolene and Dacron meshes are the most widely used ones, because they are durable, available easily, easily sterilizable, pliable and cause less tissue reactions. They also perform well in the presence of mild infection, provided a single layer of mesh is used and non-braided sutures are employed for fixation of the wound.

Site of implant:

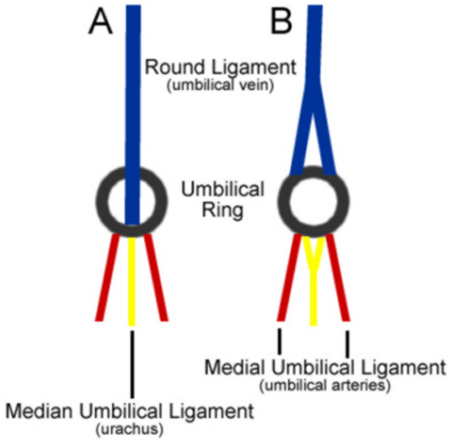
1. Intra - abdominal (Inlay graft)
2. Sub- cutaneous (Onlay graft)
3. Preperitoneal
4. Posterior to rectus abdominis muscle
5. Double graft

Among all these, preperitoneal is the best site; next to it is posterior to the abdominis muscle.

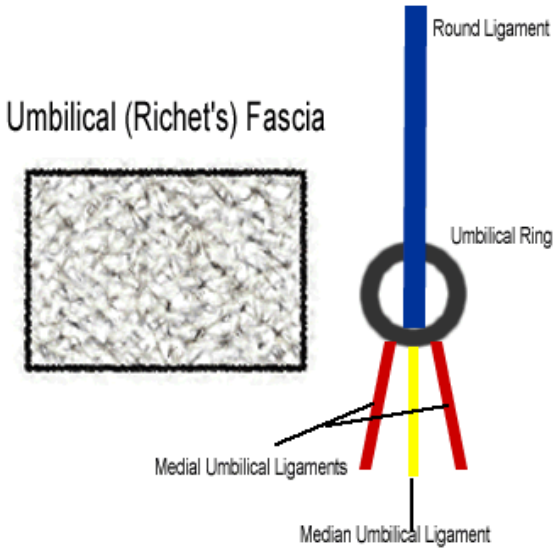
Techniques of implantation:

1. Use an implant of sufficiently large size. It should extend at least 1.5 to 3 cm beyond the defect margin.
2. Implant the prosthesis as deeply as it is reasonable.
3. Stitch the implant into position with synthetic monofilament non-absorbable sutures placed at an interval of 4-6mm.
4. Cover the implant with a muscular or aponeurotic layer.
5. When it is placed intra-peritoneally, a layer of omentum should cover the viscera.
6. Meshes should be implanted as smoothly as possible and under slight tension. Avoid wrinkles and folds in the implant.
7. When more than one layer is used; it is advisable that some of the abdominal wall be interposed between them.
8. If infection should supervene, it may not be necessary always to remove the material. Wide drainage together with the use of appropriate antibiotics and irrigation of the wound may be sufficient in most of the cases.

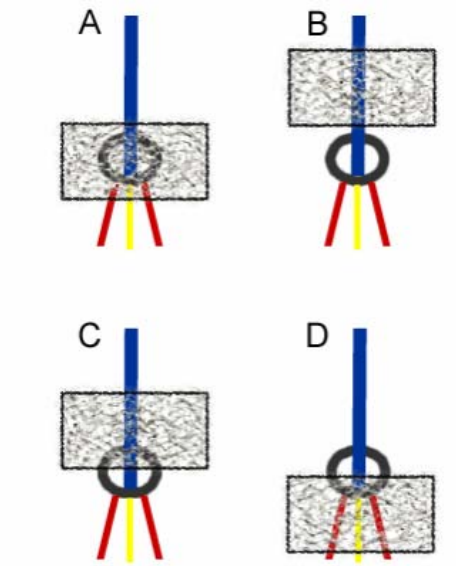
VARIATIONS IN THE DISPOSITION OF THE UMBLICAL LIGAMENTS



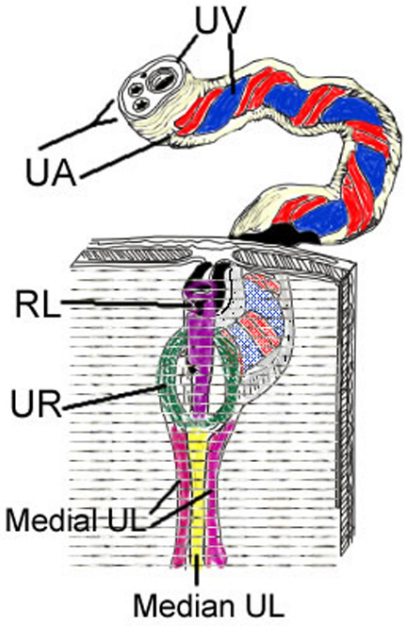
UMBLICUS & RICHET'S FASCIA



VARIATIONS IN THE DISPOSITION OF THE RICHET'S FASCIA



ANATOMY OF THE UMBLICAL RING



UMBILICAL HERINA

Umbilical herinas are the most common type of midline fascial defect and may be classified as (a) infantile umbilical herina, (b)acquired umbilical herina, (c)paraumbilical herina(supraumbilical or infraumbilical), or (d)umbilical herina in adults. Umbilical herinas occur in both children and adults, but the mode of presentation, natural history, and treatment strategy are different in the two groups.

Embryology And Anatomy Of The Umbilicus

Embryologically, the fascial margins of the umbilical defect are formed by the third week of fetal life when the four folds of the somatopleure tend to fold inward. An umbilical cord is produced in the fifth week. By the tenth week of embryonic life, abdominal contents return from their location outside the coelom into the developing abdominal cavity. The vitelline duct and the allantois regress by the fifteenth to sixteenth week. If any of these processes are defective, umbilical malformations occur .

At birth, the umbilical arteries and the umbilical vein become thrombosed, and the vitelline duct and the allantois have already been obliterated. The umbilical ring then scars and contracts. The obliterated umbilical vein (round ligament) is usually attached to the inferior border of

the umbilical ring along with remnants of the urachus and the two obliterated umbilical arteries. The round ligament, by crossing and partially covering the umbilical ring, may protect against herniation. In instances where the ligament divides and inserts in the upper part of the umbilical ring without crossing it, a potential weakness is present. The umbilical Richet's fascia also reinforces the umbilical ring. If Richet's fascia is absent, located outside the limits of the umbilical ring, or only partially covers the ring, the area appears much weaker . Askar believes that variations in decussation of aponeurotic fibres in the midline have a role in the occurrence of umbilical and paraumbilical hernias.

INFANTILE UMBILICAL HERNIA

In children, umbilical herinas are the third most common surgical disorder after hydroceles and inguinal hernias. Prematurity and low birth weight are known to predispose to umbilical hernias. There is an association between the diagnosis of respiratory distress syndrome in the immediate postnatal period and the development of umbilical hernias, possibly related to the effect of increased intraabdominal pressure associated with the respiratory distress syndrome on inadequately developed anterior abdominal muscle and fascia. Umbilical hernias are also common in children with Down syndrome, hypothyroidism, mucopolysaccharidosis (particularly Hurler's syndrome), Beckwith-Wiedemann syndrome, and trisomy 13 and 18 . The tendency to spontaneous resolution is maintained in patients with Down syndrome. There also appears to be a 9% to 12% familial predisposition to umbilical hernias.

Diagnosis

The most common reason for a child's referral with an umbilical hernia is the cosmetic appearance. The hernia results in a cone-like protrusion at the umbilicus that bulges every time the child cries or strains . There may also be a history of vague abdominal pain or pain on pressure over the umbilicus. The size of the fascial defect must be evaluated, a collar of fibrous tissue typically being found at the neck of the sac. The reducibility of the hernia should also be evaluated, incarceration being extremely rare. The whole length of the linea Alba above the umbilicus should also be evaluated to identify a coexisting paraumbilical or epigastric hernia, or diastasis recti.

Natural History

The majority of infantile umbilical henias resolve spontaneously. The size of the umbilical ring appears to be an important determinant of the spontaneous resolution of umbilical hernias. Fascial defects greater than 1.5 cm persisted into adult life. Complication of infantile umbilical hernias are extremely uncommon, incarceration being estimated to occur in 1:1,500 cases .

Treatment

The treatment options are observation and operative repair. Unless complicated by pain, incarceration, or strangulation, there is no indication for surgical intervention before age 2 years. If the fascial defect is less than1.5 cm, there is a high likelihood of spontaneous resolution.

British society of paediatric surgeons, recommends repair prior to the child commencing school (age 3 to 4 years). Similarly, if the fascial defect is greater than 1.5cm, there is probably no more than a 50% chance of spontaneous resolution and surgical repair is indicated. Any child with a tender hernia, even if it is reducible, warrants early surgical intervention.

Operative Technique

A curvilinear “Smile” incision is made within a skin fold on the inferior aspect of the hernia. The apex of the umbilicus may be elevated with a tissue holding forceps to aid the placement of the incision if necessary. The incision is carried through the subcutaneous fat to expose the caudal aspect of the sac. The sac neck is then encircled by blunt dissection with a hemostat. The apex of the sac is dissected off the undersurface of the umbilicus and the edges of the sac adherent to the fascial defect mobilized. Once the sac is completely mobile, it is reduced by inversion into the

abdominal cavity. The fascial defect is repaired by interrupted mattress sutures, using a nonabsorbable surure of appropriate size. Extensive extraperitoneal dissection is unnecessary as, once the sac has been inverted the fascial edges become clear and mattres sutures may be safely positioned. If is not necessary to “double-breast” the repair. Occasionally, umbilical vessels may require ligation. It is usually easier to obtain a tension - free repair in the transverse direction. If the defect is larger vertically or if there is an associated supraumbilical defact, a longitudinal closure is more appropriate. The inner surface of the cicatrix is tacked down to the area of the fascial repair with one or two nonabsorbable sutures. After meticulous hemostasis has been secured, the subcutaneous tissues are approximated with interrupted absorbable sutures and a subuticular skin closure is performed, also with an absorbable suture.

Other techniques of managing the sac include incising the sac on its caudad aspect. Abdominal contents may adhere to the fundus of the sac, and such an incision avoids inadvertent damage to them. Once the sac has been entered, the contents are reduced and the incision is carried around to the cephalad aspect of the sac. The cut edges of the sac are held up, to permit abdominal contents to fall back into the peritoneal cavity. Horizontal mattress sutures may then be placed at the edges of the facial defect and the defect repaired.

ACQUIRED UMBILICAL HERNIA

Patients with acute abdominal distension (e.g. intestinal obstruction) often have a partially unfolded umbilical cicatrix. If the raised intraabdominal pressure persists, the umbilical cicatrix give way, resulting in an acquired umbilical hernia. Acquired hernias may be noted in patients who have ascites resulting from cirrhosis, congestive heart failure, or nephrosis. Patients undergoing peritoneal dialysis also have a higher incidence of acquired umbilical hernias. Patients with serious underlying problems should not undergo operative repair unless the hernia incarcerates or the overlying skin is thinned down to such an extent that spontaneous rupture is possible. If surgical intervention is required, the fascial defect is often too large to be closed primarily with sutures without the repair being under excessive tension. In these cases, the defect is best closed with prosthetic mesh sited in the preperitoneal plane.

PARAUMBILICAL HERNIA

Paraumbilical hernias occur in all age groups, but are more common after age 35 years and are five times more common in women than in men. These lesions are the result of defects in the linea alba and the umbilical fascia, the latter being a direct extension of the transversalis fascia. The most common site is in the supraumbilical linea alba, but defects can also occur below the umbilical hernias and can be multiple especially when associated with diastasis recti.

Paraumbilical hernias do not resolve spontaneously. The most common presenting symptom is pain (possibly caused by dragging on the fat and peritoneum of the falciform ligament), with or without a lump being present. The influence of complications, such as incarceration, inflammation and gangrene, is much higher that for true umbilical hernias.

Diagnosis:

Due to the difference in natural history, these hernias must be distinguished from umbilical hernias. In the supraumbilical hernia, about half of the fundus of the sac is covered by the umbilicus, and the skin of the abdomen immediately above the umbilicus covers the remainder. This is in contrast to the umbilical hernia., in which the protrusion is directly under the umbilicus with a circumferentially symmetric bulge. In addition, paraumbilical hernias have no collar of fibrous tissue at the neck. If the hernias is small, the diagnosis may be aided by standing the patient erect and tracing the line of the linea alba with the pulp of one finger. The paraumbilical hernia may be felt as a small, palpable nodule, often tender, just above or below the umbilicus.

Operative Technique

Surgical repair is always indicated because these hernias do not resolve spontaneously. If the defect is difficult to feel with the patient supine, the position of the hernia should be marked preoperatively with the patient standing. For solitary lesions separated from the umbilicus, the traditional incision is horizontal directly over the hernia. The incision is carried down through the subcutaneous fat and the fascial margins dissected out circumferentially around the protruding fat. If the fat is viable, it is

reduced into the preperitoneal plane; if ischemic or gangrenous, it is best excised. The fascial defect is then closed either horizontally or vertically, depending on the orientation of the defect and the direction that produces least tension. Mattress sutures of nonabsorbable material of appropriate size are used. The subcutaneous tissues are then opposed with absorbable sutures and the skin closed with a subcuticular suture.

In patients with a paraumbilical hernia associated with an umbilical hernia, the incision can be made curvilinear in the same fashion as for an infantile umbilical hernia, except that it is made supraumbilically. In such cases, the fascial defect is best closed in a vertical direction. It is important to examine the whole of the linea alba from within by placing finger through the defect and palpating the fascia up to the xiphoid process. If multiple fascial defects are present, a vertical midline incision encompassing all of the defects is advised.

With the increasing role of laparoscopic surgical techniques, both occult umbilical and paraumbilical hernias are being encountred more frequently. If present at the time of laparoscopy, it is important to repair the fascial defect of the hernia in addition to the fascial defect created by the 10mm trocar.

UMBILICAL HERNIA IN ADULTS

The pathophysiology of umbilical hernia in adults is disputed. It is generally believed that these hernias do not represent persistence from childhood but arise de novo in adult life. While the infantile umbilical hernia is a direct hernia, umbilical hernias in adults are indirect herniations through an umbilical canal that is bordered by umbilical fascia posteriorly, the linea alba anteriorly, and the medial edges of the two rectus sheaths on each side. Therefore, these hernias tend to incarcerate and strangulate, and do not resolve spontaneously. Askar suggests that they are really paraumbilical hernias that occur just above and laterally to the umbilicus. Their clinical behaviour is certainly more akin to paraumbilical hernias. The incidence of incaceration of umbilical hernias in adults is 14 times than in children. In addition there is a high associated morbidity and mortality. There is a large sex difference with over 90% occurring in women, and almost all are obese and multiparous. In this patient population, umbilical hernias incarcerate half as often as inguinal hernias and three times more often than femoral hernias . There is no racial difference in incidence.

As for the acquired umbilical hernias, which are direct hernias, umbilical hernias in adults are also common in cirrhotic patients with ascites (a reported incidence of 24%). It appears that a persistant increase in intraabdominal pressure excerted against a thinned-out umbilical ring and fascia is the cause of herniation in both the cirrhotic patients with ascites and the obese multipara. The factors that determine whether the hernia occurs through the umbilical cicatrix or through a paraumbilical canal are not known.

Diagnosis

The diagnosis of umbilical hernia in adults is usually obvious. In large hernias, reduction is often impossible because omentum becomes adherent to the sac. In addition, if the hernia is long-standing, there are often multiple fascial defects. As the hernia enlarges, it becomes oval and has a tendency to drag downward. These hernias are very symptomatic. Patients complain of a local dragging pain, due to the weight of the lesion; gastrointestinal symptoms, probably due to traction on the stomach or transverse colon; and intermittent colicky pain, due to partial intestinal obstruction. In long-standing cases, maceration of adjacent skin surfaces by the panniculus and chronic infection can be noted.

Operative technique:

Non operative therapy of any sort is uniformly unsuccessful. In elective cases, it is important to identify and underlying associated pathology and try to improve the general condition of the patient before undertaking surgical correction. Unfortunately, these patients often have incarcerated hernias, and prolonged preoperative therapy is not possible. Large adult umbilical hernias are difficult operations, and their difficulty should not be underestimated.

In smaller adult umbilical hernias, a subumblical incision can be used, but large hernias and particularly incarcerated hernias, often require a large incision that may be either transverse or vertical. Dissection is carried around the hernia sac through the subcutaneous tissue down to the aponeurotic layer above, below and on the sides of the sac. The entire mass of skin, fat, and hernia is elevated while the neck of the sac is incised because adhesion of the underlying omentum or bowel are likely at the fundus. The incarcerated contents must be evaluated and treated as required. Ritcher's hernia occurs not uncommonly and must be actively sought. Concomitant buttonhole defects are also frequently present and the facial bridge should be divided to create a single fascial defect. After the contents are dealt with and reduced, the redundant sac should be excised and, if

possible the peritoneum closed with absorbable sutures. Ideally, the facial defect should be repaired with primary sutures with non absorbable sutures and edge-to-edge closure performed in either the transverse or the vertical direction, whichever is appropriate. The classic Mayo “Vest-over-pants” operation has been discarded since Farris demonstrated that the bursting strength of the wound did not improve by imbrication and actually was impaired to a degree that was proportional to the amount of overlapping and tension.

The overlying umbilical skin usually should not be excised unless it is macerated or infected. In such cases, a new umbilicus could be created. However, this increases the risk of recurrence at the point where the umbilicus is created. The patient should therefore be advised preoperatively that the umbilicus will be excised and the new umbilicus not created. It may not oppose the fascial edges in large hernias without undue tension; and in these cases the defect should be repaired with a prosthetic mesh anchored circumferentially beneath the aponeurotic layer. If the site of operation is infected, it is acceptable to leave the subcutaneous fat and skin open and plan for delayed primary closure when the infection has settled.

EPIGASTRIC HERNIA

An epigastric hernia (fatty hernia of the linea alba) may be defined as a fascial defect in the linea alba between the xiphoid process and the umbilicus. It is the second most common location of a defect in the aponeurotic-fascial layer in the midline, the most common being an umbilical hernia.

Demographics:

As many epigastric hernias are asymptomatic, they remain undiagnosed, and the actual incidence of epgastric hernia is therefore difficult to determine. Autopsy studies suggest a prevalence of 0.5% to 10% in the general population. There is a male predominance, with male to female ratio of atleast 3:1. The diagnosis is usually made in the third to fifth decade.

Etiology and pathogenesis:

Current opinion is that an epigastric hernia is an acquired lesion, probably related to excessive strain on the anterior abdominal wall aponeurosis. Askar applied his studies of the anatomy and function of the anterior abdominal wall to the problem and emphasized the importance of the pattern of aponuerotic decussation in the pathogenesis of an epigastric hernia.

Clinical presentation:

The majority of epigastric hernias, up to 75% are asymptomatic. The most common presenting feature is a lump that the patient has noticed but that is not causing any symptoms. Alternatively, a lump may be felt during examination of the abdomen for another reason. Smaller hernias, even when they are not incarcerated, tend to cause more symptoms than do larger ones. Symptomatic hernia present with a wide variety of complaints, many of which are seemingly unrelated to the hernia. Common symptoms include epigastric pain that is dull, burning, or colicky and sometimes radiates to the lower abdomen, back, or chest; this may occasionally be accompanied by abdominal distention, dyspepsia, nausea, and vomiting. The typical pain of an epigatsric hernia is the epigastric pain on exertion. The pain is often exacerbated by bending or standing and relived by reclining in the supine or prone position.

Incarceration is common, especially in smaller hernias, probably occurring in over 50% of cases, but strangulation is rare. Strangulation of preperitoneal fat or omentum results in localized pain and tenderness. Incarceration and strangulation of intraabdominal viscera are extremely rare, with the symptoms produced related to the organ incarcerated.

Askar described a method of dealing with larger defects (greater than 2.5 cm) based on bridging the fascial defect with strips of autograft fascia lata. Contemporary practice would employ a prosthetic, polypropylene mesh that should be fixed in the preperitoneal, retromuscular plane as for incisional hernias.

The size of the midline incision is debatable. It has been recommended that the whole of the midline be exposed from xiphoid to umbilicus to avoid missing multiple defects. An alternative approach is simply to expose the defect itself with an approximately 2cm diameter ring of normal fascia. Once the hernia has been reduced/excised, a finger is inserted through the defect and searches superiorly and inferiorly to define any further defects that may not have been obvious on examination. If other defects are palpable, the skin incision can then be extend to visualize those defects and the incision in the linea alba subsequently extended to combine all the defects into one. An effective primary suture closure can be achieved by placing non absorbable sutures 1 cm apart, taking 1.5 cm bites on either side of the defect.

SPIGELIAN HERNIA

Spigelian hernias are rare and generally difficult to diagnose because of their often intramural location and vague and non specific symptoms. The diagnosis has been considerably aided by the introduction of real-time ultranographic scanning and computed tomography (CT), and the number of proven spigelian hernias has dramatically during the last 20 years.

Anatomy:

The semilunar line forms and marks the transition from muscle to aponeurosis in the transverses abdominis muscle of the abdomen. It is a lateral convex line between the costal arch and the public tubercle. The part of the aponeurosis that lies between the semilunar line and the lateral edge of the rectus muscle is often called the **spigelian fascia or zone.**

Spigelian aponeurosis is a more accurate anatomic designation. Protrusion of a peritoneal through a congenital or acquired defect in the spigelian aponeurosis is referred to as hernia spigelian or spigelian hernia.

Hernias that penetrate the spigelian aponeurosis within Hesselbach's triangle (ie., caudal and medial to the inferior epigastric vessels) are called low spigelian hernias.

Etiology:

Congenital spigelian hernia are rare and the lesion is acquired in most cases. The musculoaponeutric structure within and ventral to the spigelian aponeurosis generally is considered to be the most important contributing factor. The spigelian aponeurosis is one of the congenital weak areas in the ventral abdominal wall. Other predisposing factors are the same as for other types of hernias. (Eg: Collagen disorders, increased intraabdominal pressure of any cause). Spigelian hernia has been observed in patients treated with continuous ambulatory peritoneal dialysis.

Spigelian hernia is associated with a high incidence of incarceration of a small hernial opening with rigid edges and the fact that the hernia is often diagnosed when symptoms consistent with incarceration are apparent.

Diagnosis

The symptoms that cause a patient to consult a physician are usually abdominal pain, a mass in the anterior abdominal wall, or signs of incarceration with or without intestinal obstruction. The pain varies in type, severity, and location, and depends on the content of the hernia. Abdominal pain of uncharacteristic type, not typical of a hernia, is common, Pain can often be provoked or aggravated by maneuvers that increase intraabdominal

pressure and is relived by rest. Intense pain occurs if the hernia is incarcerated, and if intestine is present in the hernial sac at the same, symptoms of intestinal obstruction may ensue.

Physical Examination

If the hernia produces a palpable mass along the spigelian aponeurosis, the diagnosis is generally easy to make, provided the possibility of this hernia is considered. If the contents of an abdominal mass can be reduced, a spigelian hernia is highly probable. The same applies if the hernia appears when the patient is upright and reduces spontaneously when the patient lies down, or if it appears when the patient strains or lifts heavy loads. The palpable mass, therefore is most prominent lateral to the spigelian aponeurosis .

The hernial orifce, while not often palpalable, may be palpated through the external aponeurosis in some cases if the patient is examined with a tense abdominal wall. Physical examination should be carried out while the patient alternatively tenses and relaxes the abdominal muscles. When the abdominal muscles are tensed, all patients with spigelian hernia have a tender spot over the hernial orifice in the spigelian aponeurosis.

Ultrasonic scanning is now a valuable diagnostic tool in both palpable and nonpalpable spigelian hernias.

Computed tomgraphy (CT) is a good alternative to ultrasound and is able to clearly delineate the abdominal wall layers . CT provides information about the hernial orifice, the sac and the sac contents. Scanning must include the abdominal wall defect, and the distance between cross-sectional scans must be short.

Surgical Treatment

Spigelian hernia should be treated by surgical repair. Traditionally, different incisions have been recommended for palpable and nonpalpable hernias. If no palpable hernia or hernical orifice is detected preoperatively, a preperitoneal exploration through a paramedium incision provides good exposure . The paramedian incision is made through the anterior lamella of the rectus sheath and the rectus muscle retracted medially so that the posterior lamella can be split longitudinally. Preperitoneal dissection is then carried out down to the spigelian aponeurosis. This enables easy inspection of a large part of the spigelian aponeurosis and posterior lamella of the rectus sheath. The hernial orifice and additional aponeurotic defects can be exposed without difficulty and repaired without cutting muscles and aponeuroses ventral to the spigelian aponeurosis.

The advent of laparoscopic hernia repair has made these approaches obsolete in the hands of experienced laparoscopists . Spigelian hernias are ideally suited to preperitoneal laparoscopic repair because the defect in the spigelian aponeurosis is more clearly identifiable in the preperitoneal plane.

Colour Plates

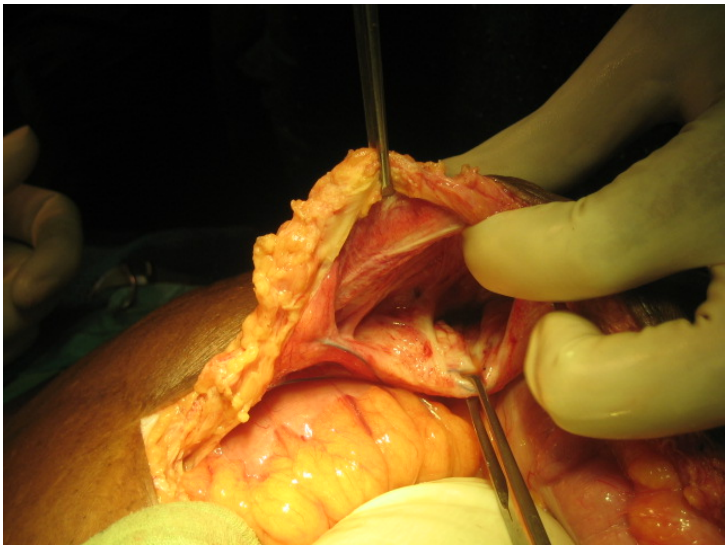
OBSTRUCTED INCISIONAL HERNIA

PARA UMBLICAL HERNIA

UMBLICAL HERNIA

IRREDUCIBLE EPI GASTRIC HERNIA

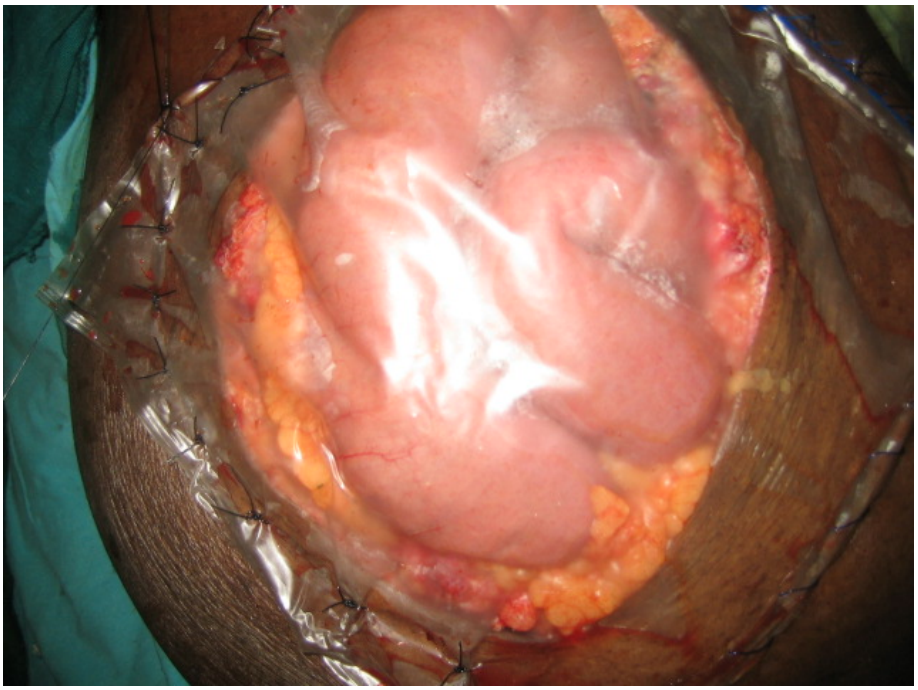
INTER PARIETAL HERNIA



WOUND GAPPING WITH MESH EXTRUSION

LAPAROSTOMY DONE FOR AN

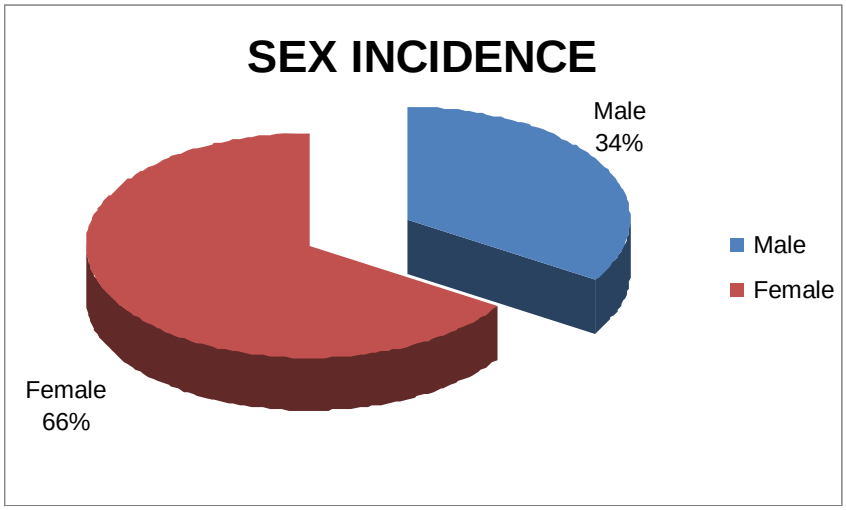
OBSTRUCTED INCISIONAL HERNIA



Observation & Analysis

OBSERVATION & ANALYSIS

1. SEX INCIDENCE

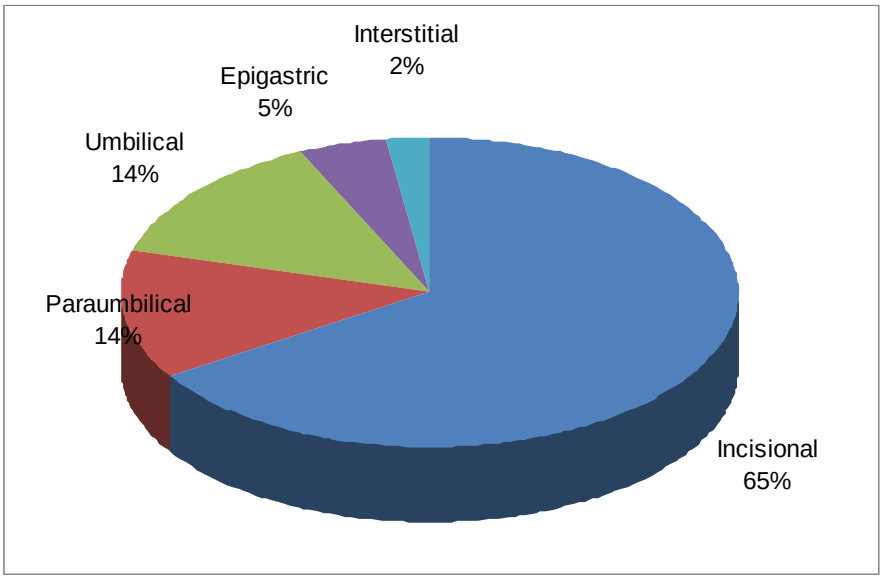


Sex	No. of Patients	Percentage
Male	15	34%
Female	29	66%

In this study, out of 44 cases of complicated ventral hernias, 29 were females & 15 were males.

There is a female preponderance observed in this study. This preponderance is perhaps due to increased incidence of ventral hernias in females due to inherent weakness of anterior abdominal wall and increased surgeries performed for obstetric and gynaecological problems.

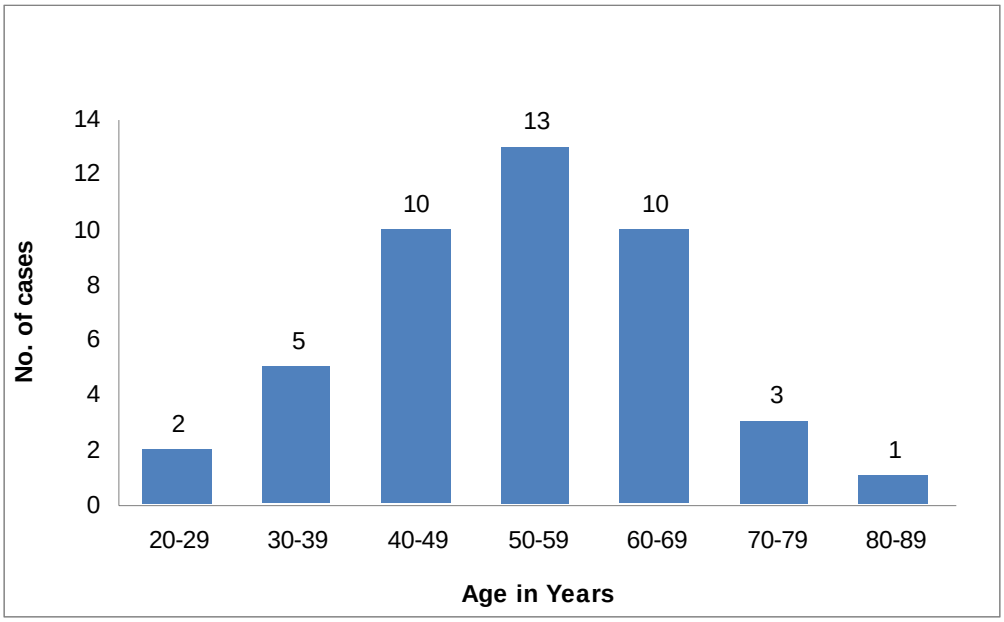
2. TYPES OF VENTRAL HERNIA



Types of Hernia	No. of Cases	Percentage
Incisional	29	66.1%
Paraumbilical	6	13.6%
Umbilical	6	4.5%
Epigastric	2	13.6%
Interstitial	1	2.2%

Among ventral hernias presenting as emergencies. Incisional hernia constitutes the major part accounting for 66%, followed by umbilical and paraumblical hernia 13.6% each. Epigastric hernia constitutes 4.6%. interstitial hernia forms the least 2.2%.

3. AGE INCIDENCE

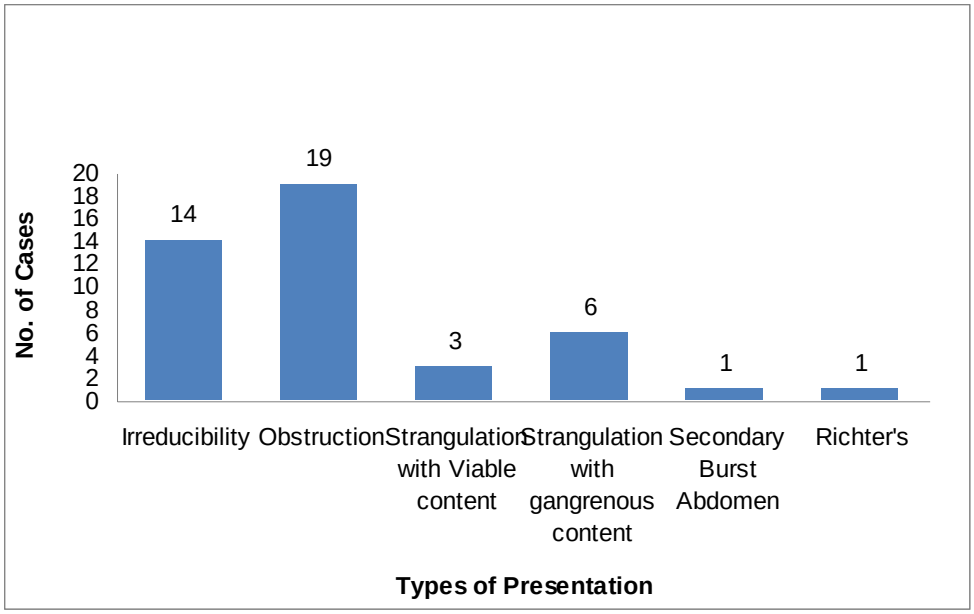


Age	No. of Cases
20-29	2
30-39	5
40-49	10
50-59	13
60-69	10
70-79	3
80-89	1

Peak incidence of complication in ventral hernia is noted in the 5th decade of life. Majority of the people presenting with the complications are between 40 - 70 years. Complicated paraumbilical herenia presented at the median age of 55 with lowest age incidence of 35 years in this study.

Complicated umbilical hernia presented at the median age of 60 with lowest age incidence of 52 years. Incisional hernia included a wide spectrum of age. Complication is reported in as young as 22 years to 80 years. Median age of presentation is 47 years.

4. TYPES OF PRESENTATION

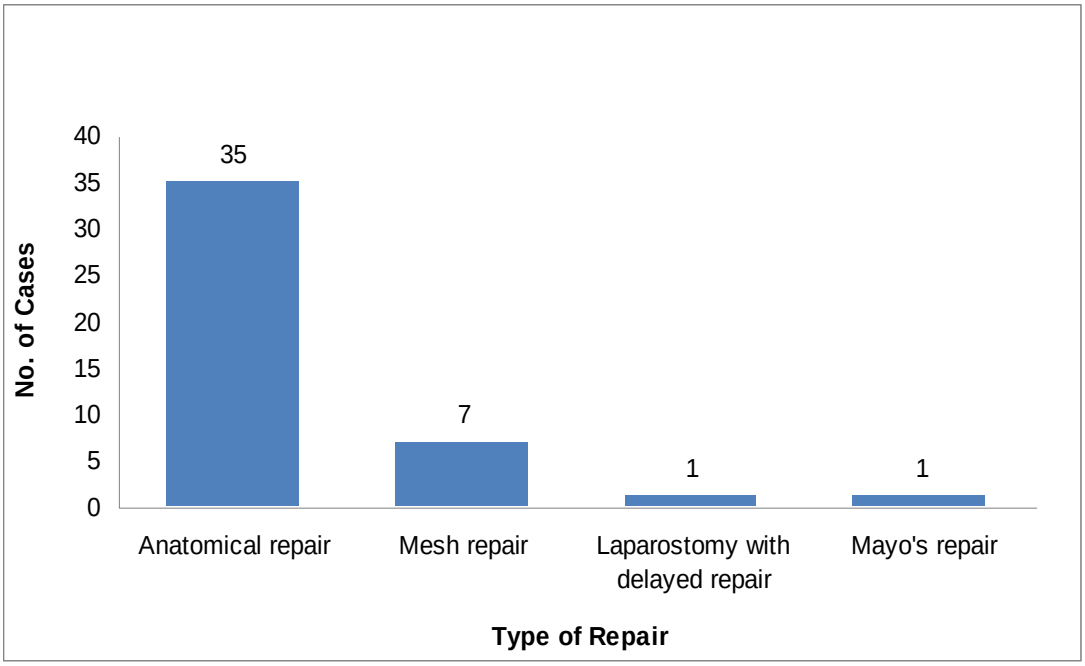


Types of Presentation	No. of Cases	Percentage
Irreducibility	14	31.82%
Obstruction	19	43.18%
Strangulation with Viable content	3	6.81%
Strangulation with gangrenous content	6	13.64%
Secondary Burst Abdomen	1	2.27%
Richter's	1	2.27%

Irreducibility alone was found in 31.82%. Intestinal obstruction without strangulation of blood supply was found in 43.18%.

Strangulation with vascular compromise is seen in 20.45% cases, in half of these cases viability didnot return with warm saline pack and 100% oxygen and resection amartomosis was performed. Richters hernia is reported in 2.27% of cases. 2.27% cases presented as burst abdomen.

5. TYPES OF REPAIR

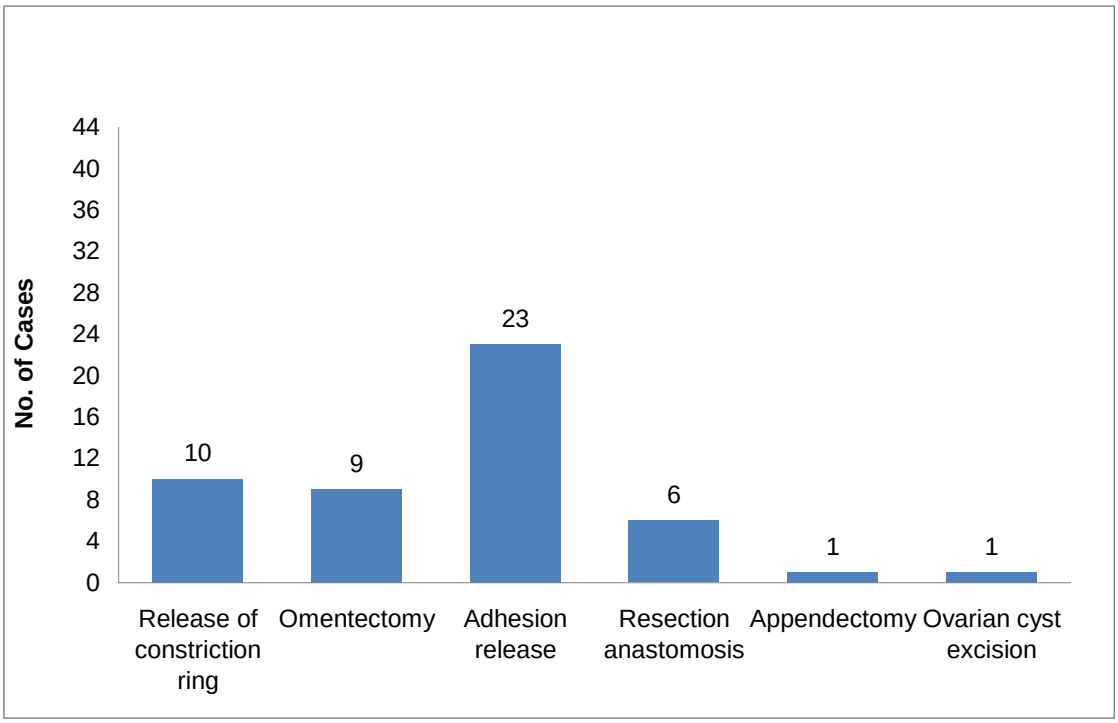


Type of Repair	No. of Cases	Percentage
Anatomical repair	35	79.54%
Mesh repair	7	15.90%
Laparostomy with delayed repair	1	2.27%
Mayo's repair	1	2.27%

Anatomical repair is performed in majority of the patients it constitutes 79.54% of the procedures performed.

Mesh repair was performed in 15.90% cases. Mayo's repair of double breasting is performed in 2.27% cases. And laparostomy was performed in 2.27% of cases.

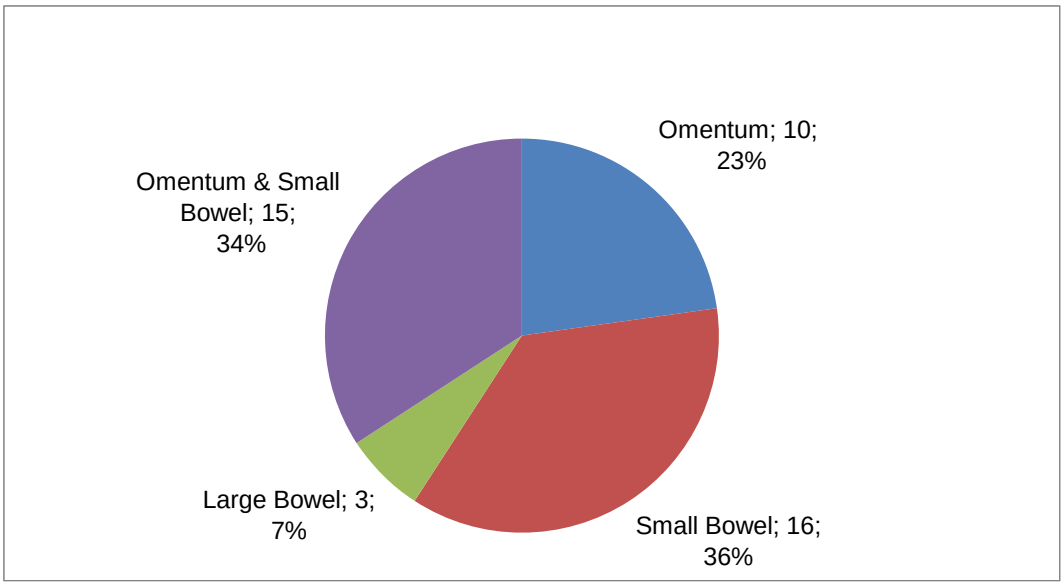
6. OTHER PROCEDURES PERFORMED



Procedures performed	No. of Cases
Release of constriction ring	10
Omentectomy	9
Adhesion release	23
Resection anastomosis	6
Appendectomy	1
Ovarian cyst excision	1

Constriction ring was responsible for irreducibility in 22.7% case, approximately one fourth of cases. In the remaining ¾ of cases adhesions between the sac and the omentum, interloop adhernious and the resultant kinking and angulaton of bowel were responsible for irreducibility and strangulation. omentectomy was performed in 1/5 of cases (20.45%).

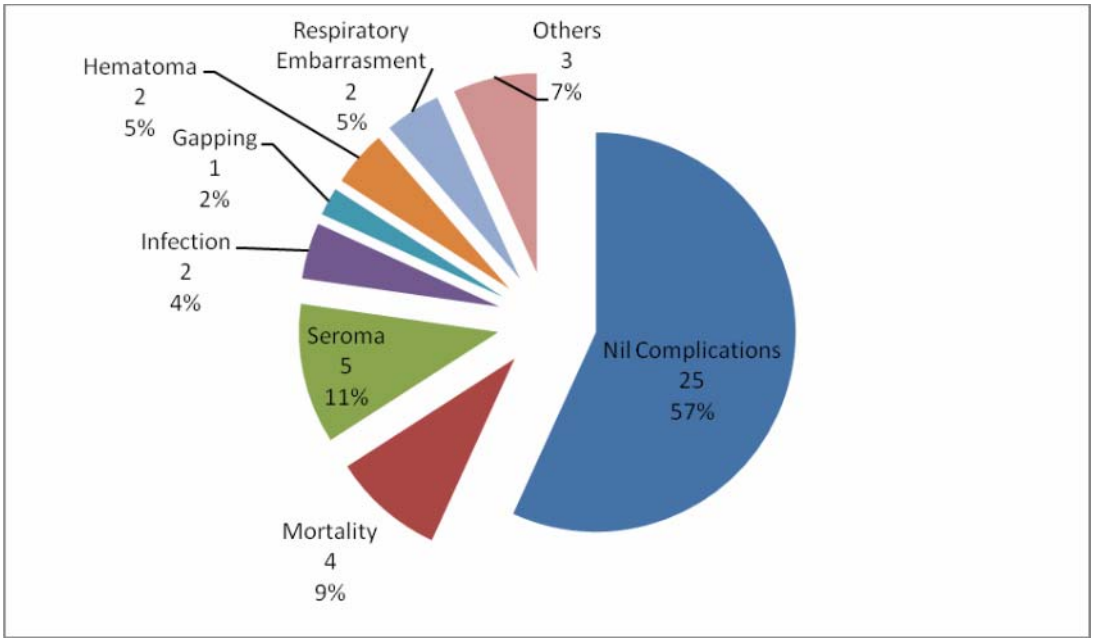
7. CONTENT



Content	No. of Cases	Percentage
Omentum	10	22.7%
Small Bowel	16	36.4%
Large Bowel	3	6.8%
Omentum & Small Bowel	15	34.09%

Small bowel is the commonest content followed by small bowel and omentum, omentum and large bowel in decreasing order of frequency.

8. MORBIDITY



Morbidity & Mortality	No. of Cases
Nil Complications	25
Mortality	4
Seroma	5
Infection	2
Gapping	1
Hematoma	2
Respiratory Embarrasment	2
Others	3

Overall morbidity in the post operative period was about 34.09%. Seroma and heamatoma are the most frequent complication encountered in the early post operative period followed by wound infection and gapping. Other causes like wound induration, postop ileus and chest infection accounted for 6.8%.

Respiratory embarrassment was encountered in two patients requiring ventilatory support in the early post operative period.

MORTALITY

Mortality rate in this study is 9.09%. Mortality was encountered in 4 cases in the post operation period. Two patients died of due to respiratory failure who had preexisting pulmonary insufficiency, one patient succumbed to sepsis and another patient died of due to ischemic heart disease and concurrent chest infection.

Discussion

DISCUSSION

Ventral hernias presenting as emergency are more common in females because of increased incidence of ventral hernias due to inherent weakness of abdominal wall due to repeated stretching of fascia during pregnancy and also due to delay in seeking medical advice when the hernia is asymptomatic.

Majority of the patients are in their 5th decade of life. Median age of presentation varies with different type of ventral hernias. Median age of occurrence of complication in paraumblical hernia is 5 years earlier than umbilical hernia.

Incisional hernias presenting with complication included a wide range of age group between 22-80 years.

Incisional hernia in the commonest ventral hernias presenting as emergency followed by paraumbilical and umbilical.

Most frequent complication encountered was obstruction, followed by irreducibility without obstruction and strangulation with gangrenous content in the order of decreasing frequency.

Burst abdomen is the rarest complication occurring in longstanding neglected cases with thinned out skin.

Large hernias that are present for a long period of time are often associated with functional loss of the abdominal wall.

The abdominal viscera begin to reside in the hernia defect and the abdominal musculature contracts. The repair of these defects can be quite challenging in the setting of intestinal obstruction with dilated bowel loops and intestinal wall edema. closing these wound under tension increases the risk of recurrence. Tension also increases the intra-abdominal pressure. This has the effect of elevating the diaphragm, thus decreasing respiratory excursion and consequently increasing the risk of development of pulmonary complications. Venous return to the heart is also decreased, resulting in a degree of abdominal compartment syndrome, this precludes anatomical repair in few subset of patients.

Mesh repair was done in 15% of these cases to prevent the above mentioned complication. In one case laparostomy was done followed by a delayed repair. And in few patients for whom anatomical repair was

performed developed respiratory embarrassment requiring ventilatory support.

According to one large series conducted by AFC morbidity was around 11.5% and mortality rate was 1.2% in elective ventral hernia repair.

There was 3 fold increase in morbidity when these ventral hernias are repaired in emergency situation. Mortality is 7.5 times higher when these surgeries are performed on unprepared patients.

Conclusion

CONCLUSION

Ventral hernias when repaired in emergency situation carry more morbidity and mortality. Ventral hernias should be repaired in an elective manner as early as possible except in few old aged people with multiple comorbidities which strongly contraindicate surgery.

In preoperative preparation of these patients particular attention should be paid to the respiratory reserve. Preparation includes withdrawal of tobacco, respiratory physiotherapy, prescription of mucolytic agent and antibiotics in case of pulmonary infection.

Obesity is a major risk factor for recurrence. So obese patients should be asked to loose weight till they achieve ideal BMI. Wound infection is the major cause of ventral hernia recurrence. Wound infection should be prevented by careful skin preparation, use of prophylactic antibiotics, meticulous surgical technique, gentle tissue handling, sharp dissection, small tissue bites during ligature, use of fine suture (decreases the amount of foreign material in the wound), irrigation of the wound at closure (decreases the amount of of foreign and necrotic debris in the wound), meticulous hemostasis and finally obliteration of dead space.

Seroma in the major would complication which can be minimized by the use of closed suction drain and careful obliteration of dead space with subcutaneous sutures and compressive dressings or binders.

Scarred (or) atrophic skin should be excised as this type of skin is prone to ischemia and subsequent infection and old sutures should be removed completely if at all possible, as they may harbour bacteria that could result in wound infection.

Primary closure can be done for defect size less than 5cm. Mesh repair is preferred for defect larger than 5cm in size (or) in situation where facial edges are under tension.

Relaxing incisions should be used whenever tension across the wound is anticipated. Tissue expanders and progressive pneumoperitoneum techniques can be used to regain the abdominal domain.

When hernias are repaired in emergency situation, Ventral herniorraphy is preferred method whenever possible.

Mesh should not be used in situation when the surrounding skin in infected (or) when the wound is contaminated due to inadvertent enterotomy (or) whenever there is a gangrenous bowel with toxic fluid is present in the sac. Absorbable mesh is preferred in such situation.

In emergency situation where the fascial edges cannot be approximated without tension. Skin and subcutaneous layer is approximated and hernia repair is done on a later date.

Annexure

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16. A case of ruptured incisional hernia antiseptic, 2005 April supplement 102(4)

17. Hernias & abdominal wall defects, danil J.Scolt & Danil B.Jones; springer 2000.

S. NO	IP.NO	NAME	AGE/ SEX	TYPE OF HERNIA/ PRESENTATION	PER-OP FINDINGS	PROCEDURE PERFORMED	POSTOP MORBIDITY/ MORTALITY
1	9919	SARASU	45/f	Incisional /Obstructed	Omental Adhesions To Sac	Anatomical Repair/Omentectomy/Adhesion Release	Nil
2	1987	GNANAMAL	49/f	Incisional/ Strangulated	Ileal Loop Gangrenous	Anatomical Repair/Resection & Anastamosis	Nil
3	20608	LAILA	43/f	Incisional/ Strangulated	Omentum & Ileal Loopgangrenous	Anatomical Repair / Omentectomy/ Resection & Anastamosis	Wound Infection
4	26282	MALA	28/f	Incisional/ Irreducible	Omental Adhesions	Anatomical Repair/Omentectomy/Appendectomy	Nil
5	10061	KRISHNAVENI	45/f	Interstitial/ Obstructed	Ileal Loop/ Constriction Ring	Anatomical Repair/Constriction Ring Release	Nil
6	10864	GOWRI	44/f	Incisional / Irreducibility	Omental & Small Bowel Adhesions To Sac	Anatomical Repair/Omentectomy	Nil
7	3265	RAGURAMAN	70/m	Incisional/ Obstructed	Omental & Small Bowel Adhesions To Sac	Anatomical Repair/Adhesion Release	Nil
8	5250	KASTURI	38/f	Incisional/ Irreducibility	Omental Adhesions	Anatomical Repair/Omentectomy/ Constriction Ring Release	Haematoma
9	6545	NAGAMMAL	32/f	Incisional/ Irreducibility	Omental Adhesions	Anatomical Repair/Omentectomy	Nil

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10	7986	KAMALAVANI	50/f	Incisional/ Strangulated	Omental Adhesions/ Small Bowel Viable	Anatomical Repair/Adhesion Release	Post Op Ileus
11	9462	SAROJA	60/f	Incisional/ Obstructed	Small Bowel Adhesions To Sac	Anatomical Repair/Adhesion Release	Nil
12	11045	VASANTHA	50/f	Recurrent Incisional/ Obstructed	Adhesions Between Bowel Loops/ Constriction Ring	Anatomical Repair/Constriction Ring Release/ Adhesion Release	Nil
13	11314	KASIYAMMAL	55/f	Umbilical / Strangulated	Jejunal Loop - Viable	Anatomical Repair/Constriction Ring Release	Nil
14	15371	VALLIYAMMAL	60/f	Incisional/ Secondary Burst Abdomen	Small Bowel Loop	Anatomical Repair	Nil
15	18934	PANDIAN	55/m	Incisional/ Obstructed	Omental Adhesions To Sac/Inter Loop Adhesions	Anatomical Repair/Adhesion Release	Nil
16	29645	DHOWLATH	45/f	Incisional/ Irreducibility	Omental & Small Bowel Adhesions To Sac	Anatomical Repair	Seroma
17	29780	VENILA	38/f	Incisional/ Irreducibility	Omental Adhesions To Sac	Anatomical Repair/Omentectomy	Seroma

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18	36904	AMARAVATHI	47/f	Incisional/ Obstructed	Small Bowel Adhesions To Sac	Anatomical Repair	Respiratory Embarrasment
19	940	ANDAL	70/f	Umbilical/ Irreducibility	Omentum & Ovarian Mass	Anatomical Repair/Omentectomy/ Ovarian Mass Excision	Mortality /Respiratory Failure
20	1065	JAYALAKSHMI	61/f	Paraumbilical/ Irreducibility	Omentum	Anatomical Repair/ Constriction Ring Release	Nil
21	1509	VINNARASI	22/f	Incisional/ Irreducibility	Omentum & Small Bowel	Anatomical Repair	Nil
22	6209	REVATHY	42/f	Incisional/ Obstructed	Small Bowel Adhesions To Sac	Anatomical Repair	Seroma
23	4859	ELUMALAI	60/m	Incisional/ Obstructed	Omentum & Transverse Colon	Anatomical Repair	Mortality/ Chest Infection/ IHD
24	892390	MANI	60/m	Paraumbilical/ Obstructed	Omental Adhesions	Anatomical Repair/Omentectomy	Respiratory Embarrasment

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25	892575	MAHENDRAN	56/m	Umbilical/ Obstructed	Richters	Anatomical Repair/Constriction Ring Release	Hematoma
26	893077	PERUMAL	80/m	Incisional/ Obstructed	Small Bowel/ Gangrene	Anatomical Repair/Resection & Anastamosis	Mortality / Sepsis
27	896718	SUNDARI	58/f	Incisional/ Obstructed	Omentum & Small Bowel Loop	Mesh Repair	Seroma
28	899119	LAKSHMI	65/f	Paraumbilical/ Obstructed	Inter Loop Adhesion/ Adhesion To Sac	Mesh Repair	Nil
29	903094	ARUMUGAM	55/m	Incisional/ Irreducibility	Omental Adhesions	Anatomical Repair	Nil
30	904076	PETER	52/m	Umbilical/ Obstructed	Omentum & Transverse Colon	Mesh Repair	Seroma
31	88651	JANAKI	50/f	Incisional/ Obstructed	Small Bowel Adhesions To Sac	Mesh Repair	Nil
32	867786	SARADHA	38/f	Incisional/ Strangulated	Small Bowel/ Gangrene	Mesh Repair/ Resection & Anastomosis	Mesh Infection

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33	17457	ARULANANDHAM	67/m	Incisional/ Obstructed	Inter Loop Adhesion/ Adhesion To Sac	Laparostomy With Delayed Closure	Nil
34	876179	MUNUSAMY	30/m	Paraumbilical/ Strangulated	Ileal Loop Gangrenous	Anatomical Repair/Resection & Anastamosis/ Constriction Ring Release	Wound Induration
35	873836	RAHIMA	40/f	Paraumbilical/ Obstructed	Omentum & Small Bowel Loop	Mesh Repair/ Constriction Ring Release	Nil
36	875905	VARADHARAJAN	62/m	Umbilical/ Obstructed	Omental & Small Bowel Adhesions To Sac	Anatomical Repair	Mortality/COPD Respiratory Failure
37	876076	RAMASAMY	40/m	Incisional/ Irreducibility	Omentum	Anatomical Repair	Nil
38	889473	SRINVASAN	57/m	Recurrent Incisional/ Obstructed	Ileal Loop Gangrenous	Anatomical Repair/Resection & Anastamosis	Wound Infection
39	812468	PAULRAJ	65/m	Epigastric / Obstructed	Omentum & Transverse Colon	Anatomical Repair/Constriction Ring Release	Nil
40	817351	SUNDARI	50/f	Paraumbilical/ Obstructed	Omentum & Small Bowel Loop	Anatomical Repair	Nil

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41	856776	HANIFA	70/m	Umbilical/ Obstructed	Small Bowel	Mayo's Repair	Nil
42	867375	SARASWATHY	50/f	Incisional/ Irreducibility	Omentum	Mesh Repair	Wound Gapping
43	822943	PADMAVATHY	65/f	Incisional/ Obstructed	Omentum & Small Bowel Loop	Anatomical Repair	Nil
44	22675	VALLI	55/f	Epigastric/ Irreducibility	Omentum	Anatomical Repair/ Constriction Ring Release	Nil